

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of Targeted Changes to the
Commission's Rules Regarding Human
Exposure to Radiofrequency Electromagnetic
Fields

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ET Docket No. 19-226

COMMENTS OF ENERGOUS CORPORATION

Daniel Lawless, Vice President of Regulatory
William Manning, Sr. Director of Regulatory

Energous Corporation
3590 North First Street
Suite 210
San Jose, CA 95134-1812

Phillip R. Marchesiello
James J. Park
Mark A. Settle, P.E.

Wilkinson Barker Knauer, LLP
1800 M Street, NW Suite 800N
Washington, DC 20036
202.783.4141

Counsel to Energous Corporation

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Energous Corporation (“Energous”), by its counsel, hereby submits these Comments in response to the *Notice of Proposed Rulemaking* (“*NPRM*”) adopted by the Federal Communications Commission (“FCC” or “Commission”). The *NPRM* requests public comment regarding how the Commission should regulate and issue equipment authorizations for wireless power transfer (“WPT”) devices.¹

I. INTRODUCTION AND EXECUTIVE SUMMARY

Energous agrees with the Commission that further examination of the Commission’s current regulation of WPT technologies is warranted. As recognized by the *NPRM*, WPT devices are authorized today as a form of industrial, scientific, and medical equipment (“ISM”) under the Commission’s Part 18 rules or as generic unlicensed devices under Part 15. As the Commission notes in the *NPRM*, however, neither rule part was designed to address WPT devices, which has created a substantial amount of regulatory uncertainty regarding their application in the WPT

¹ *Targeted Changes to the Commission’s Rules Regarding Human Exposure to Radiofrequency Electromagnetic Fields*, Resolution of Notice of Inquiry, Second Report and Order, Notice of Proposed Rulemaking, Memorandum Opinion and Order, 34 FCC Rcd 11687 (2019) (“*NPRM*”); see also *Office of Engineering and Technology Extends Comment and Reply Comment Deadlines for Human Exposure To Radiofrequency Electromagnetic Fields Proceeding*, Public Notice, DA 20-521 (May 15, 2020).

context. This is especially true with respect to WPT devices intended to transfer power over a distance, often called wireless power transfer at-a-distance devices.² Part 18 requires ISM devices to “generate and use locally” radiofrequency (“RF”) energy and prohibit radiocommunications,³ which places the fundamental purpose of WPT devices at odds with a gating requirement imposed by ISM regulations.

For this reason, Energous requests the FCC to adopt a new rule part to regulate the design and equipment authorization of WPT devices, as well as the use of spectrum for WPT. By developing a new rule part for WPT devices, rather than continuing to attempt to apply the Commission’s legacy ISM and/or Part 15 rules to nascent WPT technology, the Commission can create regulatory certainty for the WPT industry and avoid the needless restrictions caused by the imprecise application of rules not designed to apply to WPT. In turn, this will reduce regulatory delay, promote continued innovation in the WPT sector, and facilitate U.S. WPT companies to maintain their leading role in the development and commercialization of this promising technology.

Unlike the Commission’s ISM rules, the new WPT rule part should not contain a “local” use requirement. The ISM “local” use requirement is antithetical to the fundamental purpose of WPT—the projection of RF energy over distance. Similarly, WPT devices should be freed from ISM limitations on communications to enable WPT transmitters to communicate system control information to receivers via power transmissions, such as prioritization of devices for charging

² Energous’ comments in this proceeding focus on WPT at-a-distance devices rather than WPT devices that rely on contact-based magnetic induction or resonance techniques.

³ See 47 C.F.R. § 18.107(c) (requiring ISM devices to be “designed to generate and use locally RF energy for industrial, scientific, medical, domestic or similar purposes, excluding applications in the field of telecommunication.”).

purposes. In addition, the Commission should identify specific frequency bands for use by WPT devices, as well as maximum bandwidth requirements to prevent harmful interference to authorized radio communications. Further, the Commission should rely on applicable specific absorption rate (“SAR”) requirements and emissions limits in lieu of arbitrarily regulating the distance between a WPT transmitter and its receivers. It also should allow compliance with SAR requirements through the use of sensors that can rapidly shut down transmissions when needed for safety reasons. Lastly, the Commission should reduce its reliance on its pre-approval guidance (“PAG”) procedures for the equipment authorization of WPT devices and should permit WPT devices to be authorized on a modular basis.

II. ENERGOUS IS A GLOBAL PARTICIPANT IN THE WPT INDUSTRY

Energous is an award-winning, global leader in next-generation RF-based wireless charging technology.⁴ Founded in 2012 and headquartered in San Jose, California, Energous became a publicly traded company in March 2014 (NASDAQ: WATT) and has completed the regulatory process for its WPT technology in more than 100 countries worldwide, including the United States, various European Union countries, Japan, and Taiwan.⁵ Energous has been issued 223 patents globally, and has over 110 additional patents pending.⁶ Energous also is a member of

⁴ See generally *About Energous – Leading the Next Generation of Wireless Charging*, ENERGOUS, <https://www.energous.com/company/about-energous> (last visited June 17, 2020); *Leadership – Meet the Management Team*, ENERGOUS, <https://www.energous.com/company/leadership> (last visited June 17, 2020) (providing bios for Energous’ leadership).

⁵ See Energous, *Investor Presentation* (Mar. 2020), <https://content.equisolve.net/e254800d517e3c6d7c00207201619471/energous/db/223/1878/pdf/Investor+Deck+March+2020+FINAL+RFS.pdf>.

⁶ See *id.*; Press Release, Energous, *Energous Receives FCC Certification for New Groundbreaking Over-the-Air, Power-at-a-Distance Wireless Charging* (Apr. 21, 2020),

the board of directors of the AirFuel Alliance (“AFA”) and chairs the AFA’s Uncoupled Working Committee and Regulatory Working Committee.⁷

As an RF power transmission systems semiconductor company, Energous develops WPT technologies and customizable reference designs, including innovative chips, antennas, and software, for incorporation into consumer and industrial products manufactured and marketed by Energous’ clients for a large variety of applications. Indeed, Energous’ WattUp® technology powered the first WPT at-a-distance device to receive an equipment authorization from the Commission under Part 18.⁸ This technology can support both at-contact wireless charging, as well as over-the-air charging at distances of up to 15 feet between a transmitter and its receivers. The WattUp receiver technology is small enough that it can be utilized in a wide variety of consumer electronics, including wearables, hearing aids, earbuds, Bluetooth headsets, Internet of Things (“IoT”) devices, smartphones, medical applications, and other devices that otherwise would require battery replacement or a wired power connection.

Due to the common receiver technology used by all WattUp-powered devices, Energous’ WattUp technology contributes to a complete wireless power ecosystem that ensures interoperability across receivers and transmitters. For example, equipment manufacturers can

<https://ir.energous.com/press-releases/detail/659/energous-receives-fcc-certification-for-new-groundbreaking>.

⁷ See *generally About Us*, AIRFUEL ALLIANCE, <https://airfuel.org> (last visited June 17, 2020).

⁸ See Grant of Equipment Authorization Issued Under the Authority of the Federal Communications Commission by UL Verification Services Inc., FCC Identifier 2ADNG-MS300 (issued Dec. 26, 2017); Press Release, Energous, *Energous Receives Industry-First FCC Certification for Over-the-Air, Power-at-a-Distance Wireless Charging* (Dec. 26, 2017), <https://ir.energous.com/press-releases/detail/596/energous-receives-industry-first-fcccertification-for>.

embed WattUp chips into a wide range of receiving electronics that are compatible with any WattUp-enabled transmitter.

<u>Computer</u>	Bluetooth	Security Cameras	Razors
<u>Accessories</u>	Headsets	Lighting	Medical Monitors
Keyboards	Smart Watches	TV Remotes	Hearing Aids
Mice	Fitness Activity	Game Controllers	<u>Medical</u>
Trackpads	Trackers	Cordless Phones	Smart Pillbox
Trackballs	Handheld GPS	Smoke Alarms	Wireless Panic
Webcams	Handheld Radios	Fire Alarms	Remote
Presentation	MP3 Players	Flashlights	Heart Rate
Pointers	VR Headsets	Speakers	Monitor
	Wireless Earbuds	Clocks	Medical
<u>Digital Imaging</u>	<u>Business</u>	LED Candles	Instruments
Digital Cameras	Inventory	Radios	Medical Sensors
External Camera	Scanners	3D Glasses	Device Trackers
Flashes	Hot/Cold Mugs &	Digital Picture	<u>Toys</u>
Video Cameras	Plates	Frames	Radio-controlled
Dashboard	RFID Tags	Thermostats	Toys
Cameras	Industrial Sensors	CO2 sensors	Battery-operated
Golf Rangefinders	Restaurant	Motion Detectors	Toys
<u>Mobile</u>	Buzzers	<u>Personal Devices</u>	Drones
<u>Electronics</u>	Bluetooth	Hair Trimmers	
Smartphones	Trackers	In-ear	
Tablets	<u>Home</u>	Thermostats	
eReaders	Motion Sensors	Electronic	
		Toothbrushes	

In 2019, the first product utilizing Energous' WPT technology was launched in the U.S.

consumer electronics market, and additional products are expected to be announced and

launched in 2020.⁹

⁹ See Energous Corporation, United States Securities and Exchange Commission Annual Report Pursuant to Section 13 or 15(d) of the Securities and Exchange Act of 1934 for the Fiscal Year Ended December 31, 2019 (Form 10-K) (Mar. 13, 2020), <https://ir.energous.com/all-sec-filings/content/0001564590-20-010876/0001564590-20-010876.pdf>; Press Release, Energous, *Energous and Delight Announce Availability of World's First WattUp Wirelessly Charged Hearable on Amazon* (Aug. 6. 2019), <https://ir.energous.com/press-releases/detail/642/energous-and-delight-announce-availability-of-worlds>.

III. THE WIDESPREAD ADOPTION OF WPT TECHNOLOGY WILL UNLEASH SIGNIFICANT PUBLIC INTEREST BENEFITS

WPT will empower a seamless integration between the American public and the electronic and digital ecosystems on which they increasingly rely in all aspects of their lives. The potential of WPT to streamline our daily interaction with 5G IoT devices, mobile electronics, and health and safety applications is game-changing. WPT, and in particular WPT at-a-distance, technologies will be crucial to the development and commercial deployment of next generation electronics. Commissioner Michael O’Rielly succinctly explained this recently during a hearing before the U.S. Senate Committee on Commerce, Science, and Transportation:

I believe that wireless power may be vital for the success of future connectivity and productivity. Specifically, with billions upon billions – and perhaps trillions – of additional wireless devices expected to be deployed over the next few years, be it smartphones, IoT sensors, automated equipment and the like, providing sustainable and reliable power will be a challenge. I suggest to you that power is likely to be delivered differently in the future, as outlets with plugs and disposable batteries are likely to be replaced by wireless power. ... Specifically, obtaining sufficient components to manufacture enough wiring and long-lasting batteries to meet overall demand will be difficult, if not impossible.¹⁰

Energous agrees with Commissioner O’Rielly’s prognostication, but this future reliance on WPT will require improvements to the U.S. regulatory framework to increase regulatory certainty and reduce regulatory delay.

¹⁰ Statement of FCC Commissioner Michael O’Rielly, Before the United States Senate Committee on Commerce, Science, & Transportation Committee, Hearing on “Industries of the Future” (Jan. 15, 2020), <https://www.commerce.senate.gov/services/files/753B3002-E1AC-4FD4-998A-3FACB851BBAC>; *see also* Remarks of FCC Commissioner Michael O’Rielly Before the Mobile World Congress Americas 2019, Everything Policy Track (Oct. 23, 2019), <https://docs.fcc.gov/public/attachments/DOC-360382A1.pdf>.

5G IoT Devices. WPT stakeholders repeatedly have emphasized to the Commission the critical importance of WPT for the United States’ 5G and IoT future.¹¹ The Commission has firmly acknowledged 5G as the “next generation of wireless connectivity,”¹² one that will feature “billions and billions of connected devices in the internet of things.”¹³ Researchers in the IoT field, however, have hypothesized that such large numbers of connected devices will be challenging to power: “For employing large IoT wireless sensor networks, powering the sensors by cabling or primary batteries is not feasible” because the “cost of cabling is too high” and “the

¹¹ See generally Request for Waiver filed by Auspion Inc., ET Docket No. 19-83, at 11-15 (Jan. 3, 2019) (“Auspion Waiver Request”); see also *Office of Engineering and Technology Seeks Comment on Auspion USA, Inc. Request for Waiver of ISM “Local Use” Requirement in Parts 2 and 18 for a 24 GHz Wireless Power Transfer Device Over Distance*, Public Notice, 34 FCC Rcd 1911 (OET 2019); see, e.g., Comments of MetaPower, LLC, ET Docket No. 19-83 at 2 (Apr. 25, 2019) (“The ability to deliver steerable, wireless power will revolutionize applications in which a device’s performance or operation time are constrained by a limited on-board energy source, or where a wired connection impedes mobility.”); Reply Comments of Ossia Inc., ET Docket No. 19-83 at 1, 5 (May 10, 2019) (“The billions of connected electronic devices that will soon proliferate cannot feasibly satisfy their needs for power from wired connections or batteries. ... WPT will literally make the 5G/IoT future possible. ... The billions of new Internet-connected devices that are coming need power—and in the world there are not enough batteries to supply it or electricians to wire it.”).

¹² See e.g., FCC, *FCC Initiatives, The FCC’s 5G FAST Plan*, <https://www.fcc.gov/about-fcc/fcc-initiatives>.

¹³ See Statement of FCC Commissioner Jessica Rosenworcel, Before the United States Senate Committee on Commerce, Science, & Transportation Committee, Hearing on “Industries of the Future” (Jan. 15, 2020), <https://docs.fcc.gov/public/attachments/DOC-361933A1.pdf>. FCC Chairman Ajit Pai has also expressed his confidence on 5G being the future of connectivity:

We’re at a pivotal moment in the evolution of communications technology. Across America and around the world, private companies have begun rolling out the next generation of wireless technology—commonly known as 5G. ... Another way to think about our 5G future is that we are moving to a world where everything will be connected. Ericsson projects that an additional 13 billion devices will come online between now and 2024. Some call this future the Internet of Things. Others call it the Fourth Industrial Revolution. I call it transformative.

Remarks of FCC Chairman Ajit Pai at the Council on Foreign Relations (Nov. 5, 2019), <https://docs.fcc.gov/public/attachments/DOC-360632A1.pdf>.

maintenance issues associated with using primary batteries in a large wireless sensor network—i.e., locating batteries to be replaced, replacing these batteries and disposing of the old ones—will not be tolerated by the market.”¹⁴ In addition, IoT sensors are designed to be small and therefore only would be able to accommodate very small chemical batteries, which may not provide adequate performance, especially over time.¹⁵ Consequently, WPT technologies, especially “far-field wireless power transfer,” is the ideal alternative technology to jumpstart widescale commercial deployment of 5G IoT devices.¹⁶

Consumer Mobile Electronics. American consumers interact and rely on numerous mobile electronic devices each day, and this trend only is accelerating. Whether for communication, education, entertainment, navigation, or personal safety, reliable all-day performance of mobile devices increasingly is a necessity. Each of these devices requires power and, as devices miniaturize and batteries become smaller, devices inconveniently are required to be charged more frequently. Battery technology advancements simply have not kept pace with the demands of mobile electronics. As a result, many people are required to plug in numerous

¹⁴ VISSER H.J., PFLUG H.W., KEYROUZ S., FAR-FIELD WIRELESS POWER TRANSFER FOR IoT SENSORS, WIRELESS POWER TRANSFER ALGORITHMS, TECHNOLOGIES AND APPLICATIONS IN AD HOC COMMUNICATION NETWORKS (2016).

¹⁵ MARKUS, ELISHA & MAKHETHA, MOLEFI., WIRELESS POWER TRANSFER FOR IoT DEVICES - A REVIEW, IEEE INTERNATIONAL MULTIDISCIPLINARY INFORMATION TECHNOLOGY AND ENGINEERING CONFERENCE 254–261 (2019).

¹⁶ See *id.* (“[A] new way of energizing, namely the WPT technique is attracting increasing attention to bypass the current technical bottlenecks of batteries... and can fundamentally solve [] short battery life problems.”); *supra* note 14 (“Far-field wireless power transfer has shown to be a good alternative for low average power, duty-cycled sensors.”); DUSHANTHA NALIN K. JAYAKODY, SHREE K. SHARMA, AND SYMEON CHATZINOTAS, INTRODUCTION, RECENT RESULTS, AND CHALLENGES IN WIRELESS INFORMATION AND POWER TRANSFER, WIRELESS INFORMATION AND POWER TRANSFER: A NEW PARADIGM FOR GREEN COMMUNICATIONS (2018) (“WPT is a technology whose time has come. ... RF signal-sourced wireless power transfer methods are especially appealing to low-energy-consumption devices in IoT.”).

devices to various types of wired rechargers throughout the day. This process is cumbersome and requires downtime for electronic devices, involves tangles of wires on desks and nightstands, and results in a massive amount of electronic waste as old chargers become obsolete. WPT technology has the potential to eliminate the need for copious wires and disparate chargers by enabling consumer electronics to be seamlessly charged in the background without downtime or planning. It has the potential to become as ubiquitous and easy to use as Wi-Fi. Moreover, recent industry surveys have found that U.S. consumers are increasingly enthusiastic about the potential for wireless charging.¹⁷

Medical Monitoring and Disability Access Applications. Wireless devices also have become vital components of health and safety monitoring and disability access solutions. Health and safety monitoring devices utilize technology to enhance communication with health providers, monitor treatment-related side effects, and monitor patients.¹⁸ However, they often are limited in utility by the need to frequently remove the devices or their batteries to charge the batteries, which may incapacitate the devices for an extended period of time.¹⁹ Whether a device

¹⁷ See, e.g., Press Release, Wireless Power Consortium, *Consumers Seek Wireless Charging On the Go, New International Survey Shows* (Oct. 16, 2019), <https://www.wirelesspowerconsortium.com/data/downloadables/2/4/2/6/consumers-seek-wireless-charging-on-the-go-new-international-survey-shows.pdf>; David Grossman and Mike Brown, *Apple couldn't crack wireless charging. These companies think they can.*, Inverse (Jan. 22, 2020), <https://www.inverse.com/innovation/apple-couldnt-crack-wireless-charging-this-company-thinks-it-can>.

¹⁸ See e.g., SAMANTHA J. PARKER, *et al.*, OLDER ADULTS ARE MOBILE TOO! IDENTIFYING THE BARRIERS AND FACILITATORS TO OLDER ADULTS USE OF mHEALTH FOR PAIN MANAGEMENT, 13 BMC Geriatrics 43 (2013), <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3673892> (reporting that senior citizens are prepared to adopt mHealth technology to manage pain, but that they are concerned about batteries dying).

¹⁹ Industry statistics show that as soon as someone takes off a wearable device there is a more than one-third chance they will not put it back on. See Andrew Hooze, *3 Barriers To Success*

is monitoring a person's vital signs or serving as a fall detector, the device must be utilized full-time to be fully protective. This issue has hampered more widespread deployment of mobile health devices. In addition, certain disabled persons²⁰ and many seniors will significantly benefit from wireless charging because connecting electronic devices to battery chargers using ever-smaller ports can be difficult or even impossible for many people.²¹ WPT technology will improve the efficacy of medical monitoring devices and accessibility aids by substantially increasing the ease with which they can be recharged, thereby enhancing the quality of life of the numerous people who rely on them.

IV. THE COMMISSION SHOULD CREATE A NEW RULE PART FOR WPT

The Commission should use this proceeding to tailor a new rule part designed specifically for WPT technology. The added regulatory certainty of a new rule part will unleash the enormous potential of the currently constrained WPT industry. For this reason, other

For Wearables, Readwrite (Aug. 7, 2015), <http://readwrite.com/2015/08/07/obstacles-wearable-devices-battery-data-fashion>.

²⁰ In particular, individuals with musculoskeletal conditions may be unable to effectively manipulate small batteries and recharging wires. *See* National Institute of Arthritis and Musculoskeletal and Skin Diseases website at <http://www.niams.nih.gov>.

²¹ *See* HARTMUT MEISTER, *et al.*, IDENTIFYING THE NEEDS OF ELDERLY, HEARING-IMPAIRED PERSONS: THE IMPORTANCE AND UTILITY OF HEARING AID ATTRIBUTES, 259 *European Archives of Oto-Rhino-Laryngology* 531–534 (2002), <http://www.ncbi.nlm.nih.gov/pubmed/12434187> (“[o]lder hearing-impaired participants rated speech understanding in noise and speech understanding in quiet as the only two hearing aid features more important than handling issues.”); GURJIT SINGH, THE AGING HAND AND HANDLING OF HEARING AIDS: A REVIEW, *Hearing Care for Adults*, at 269 (2009), https://www.phonakpro.com/content/dam/phonakpro/gc_hq/en/events/2009/adult_conference_chicago/41_P69344_Pho_Kapitel_26_S265_276.pdf (“It appears that manual dexterity and hearing aid ergonomics are important consideration in the minds of patients who wear hearing aids, and they are extremely important factors that determine successful hearing aid use in terms of who keeps, wears, benefits, and experiences satisfaction from their hearing aid.”).

countries, such as Canada and Japan, have promulgated WPT-specific regulatory frameworks applicable to certain categories of WPT devices, rather than applying their legacy ISM rules.²²

Importantly, by promulgating a rule part purposefully designed for WPT, the Commission can help avoid the need for waivers to accommodate the basic and intended functionality of WPT devices. Currently, due to the “local” use requirement applicable to ISM devices, WPT companies have filed waiver requests in connection with WPT equipment authorization applications in which a receiver is intended to operate more than one meter from the transmitter.²³ The WPT industry has made clear to the Commission their opposition to this apparent informal policy and the need for regulatory reform to overcome the present obstacles to the timely authorization of WPT devices.²⁴

This arbitrary limitation greatly impedes the ability of the WPT sector to continue to innovate to expand the capabilities of WPT technology, as well as develop new use cases. WPT

²² See Industry Canada, Spectrum Management and Telecommunications, Radio Standards Specification RSS-216, Issue 2, Wireless Power Transfer Devices (Jan. 20, 2016), <https://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf10871.html>; International Telecommunication Union, *Report ITU-R SM.2303-2, Wireless power transmission using technologies other than radio frequency beam* (June 2017), https://www.itu.int/dms_pub/itu-r/opb/rep/R-REP-SM.2303-2-2017-PDF-E.pdf.

²³ Auspion Waiver Request at i (“Commission staff has interpreted ‘local’ to mean no more than a certain distance – perhaps up to three feet – and under this interpretation the Auspion system does not satisfy the definition of ISM equipment.”); *id.* at 8 (“Interpretations by Commission staff view ‘local’ in the context of power transfer to mean transmission within a set distance of perhaps up to three feet.”).

²⁴ See *e.g.*, Comments of Nikola Labs LLC, ET Docket No. 19-83 at 6 (Apr. 25, 2019) (“Fleshing out the scope of the Local Use Clause through conditioned certifications, rather than by requiring waivers, offers important public interest benefits. First, the waiver process can be time consuming, and speed to market is crucially important to the success of companies developing innovative new technologies. ... On a global scale, such delay also can cost the United States its leadership position in a new technology by enabling non-U.S. technologies and standards to capture the international market while U.S. competitors are awaiting regulatory approvals.”); Comments of IT’IS Foundation, ET Docket No. 19-83 at 1-2 (Apr. 25, 2019) (“As

companies are unlikely to conduct research and development to improve WPT technologies, and are unlikely to spend resources developing consumer and industrial devices responsive to customer demands, if the WPT companies know that they will need a Commission waiver to commercialize the technology or new products as is currently often the case—a process that can take in excess of a year. Although the need for waivers is not likely to be fully eliminated, the adoption of a new WPT-specific rule part should greatly reduce their need. This, in turn, will save both time and resources for industry participants and Commission staff.

A. The ISM “Local” Use Requirement Should Not Be Applicable to WPT Devices

As set forth above, the Commission’s current rules require all ISM equipment, including authorized WPT devices, to generate and use RF energy “locally.”²⁵ But this requirement is inapposite when applied to WPT and, in particular, WPT applications that transmit power over longer distances. The fundamental benefit of WPT technology is its ability to transmit RF energy over distance. Consequently, rather than struggle to invent a strained interpretation of the ISM “local” use requirement that can accommodate WPT, the Commission should acknowledge that

wireless power transfer (WPT) technology continues to evolve, case-by-case staff interpretations through KDB inquiries regarding the applicability of ‘local use’ can introduce highly undesirable delays for industry to bring innovative products to market.”); Reply Comments of Auspion Inc. at 2, ET Docket No. 19-83 at 2 (May 10, 2019) (“While it is widely acknowledged in industry that wireless power has enormous potential, the principal factor in technology investment decisions today in this field is the regulatory outlook. Auspion supports clear, flexible, and technologically neutral requirements to enable the industry to invest in and market a wide range of technologies, without the need for serial waivers or long KDB inquiry processes.”).

²⁵ See 47 C.F.R. § 18.107. In a pending Commission proceeding in connection with a WPT waiver request, ET Docket No. 19-83, commenters have provided extensive input regarding what the ISM “local use” requirements should mean when applied to WPT devices. See *Office of Engineering and Technology Seeks Comment on Auspion USA, Inc. Request for Waiver of ISM “Local Use” Requirement in Parts 2 and 18 for a 24 GHz Wireless Power Transfer Device Over Distance*, Public Notice, 34 FCC Rcd 1911 (OET 2019).

WPT deserves its own, separate regulatory framework that does not incorporate a “local” use requirement. The new WPT rule part should refrain from regulating the distance between a transmitter and receiver and instead should rely on applicable SAR and emissions limits.

The Commission notes that the ISM “local” use requirement is useful to “prevent high-power RF energy reaching outside the immediate vicinity of the RF generator source, which is allowed to operate at unlimited power to perform ‘work’ (non-communication functions) within the designated ISM frequency bands.”²⁶ Because the fundamental mission of WPT is to project power, it makes little sense to build a regulatory framework for the technology around rules intended to prevent the projection of RF energy. Whereas the ISM “local” use requirement is largely needed due to the type of technology that is subject to the Commission’s ISM regulations, WPT technology is expressly designed to project power in three dimensions over open space. For these reasons, rather than apply the ISM rules and their “local” use requirement to WPT, the Commission should adopt a new WPT rule part that refrains from incorporating any such requirements and instead relies on SAR and emissions regulations to ensure the safety of users and appropriate mitigation of harmful interference.

B. WPT Devices Should Be Permitted to Conduct Communications to Enable More Efficient System Controls

The Commission’s ISM rules also prohibit an ISM device to be used to transmit communications. As with the ISM “local” use requirement, this ISM-specific requirement makes little sense when applied to WPT technologies. A WPT system is composed of a transmitter and one or more receivers, which must remain in communication with each other for operational and safety reasons. In addition to being used to authenticate receivers and for receivers to request

²⁶ *NPRM* at 11753, n.381.

power, these ancillary communications also may involve the transmission by the receiver of information about its status, charge level, receive device prioritization, and location, including, when appropriate, sensor detections of a person to ensure continuous RF safety compliance. The Commission should permit these ancillary communications to be embedded in a WPT devices' power transmission.

Currently, most WPT systems rely on Bluetooth ("BLE") modules for this communications path. However, the low-bandwidth information exchange required between a transmitter and receivers also could be accomplished through modulation of the RF energy being transmitted. This more direct approach could be used to avoid the cost and complexity of incorporating BLE modules into WPT devices, which also may enable the devices to be reduced in size. Ultimately, if communications carried on a WPT transmitter's RF power transmission are limited to information pertinent to the operation of the WPT system, there is no rationale for applying the limitation on ISM communications to WPT.

C. The Commission Should Permit WPT Devices to Use Specifically Identified Frequency Bands on a Non-Interference Basis and Subject to Express Out-of-Band Emission Requirements

Because ISM devices are required to conduct work "locally," they pose less interference concern than devices that purposely transmit RF energy over distance. For this reason, ISM devices historically have been permitted to be operated in an extensive spectrum band and are not subject to the same types of harmful interference prohibitions and out-of-band emissions requirements as other RF devices regulated by the Commission. By contrast, many WPT devices are intended to transmit energy over distances. As a result, the Commission has an interest in adopting regulations that are intended to prevent WPT devices from causing harmful interference

to licensed spectrum uses, as well as to ensure that the use of unlicensed spectrum bands by WPT devices is broadly compatible with other uses of such bands.

For this reason, Energous proposes for the Commission to designate a subset of the ISM bands for WPT use, to adopt out-of-band emissions requirements applicable to WPT devices, and to prevent WPT devices from causing harmful interference to authorized radio communications services. Specifically, Energous proposes for the following frequency bands to be made available for WPT pursuant to the maximum ranges set forth below to prevent any harmful interference to authorized radio communication.

Frequency	Range
6.78 MHz	± 15.0 kHz
13.56 MHz	± 7.0 kHz
27.12 MHz	± 163.0 kHz
40.68 MHz	± 20.0 kHz
915 MHz	± 13.0 MHz
2,450 MHz	± 50.0 MHz
5,800 MHz	± 75.0 MHz
24,125 MHz	± 125.0 MHz

D. Application of the Commission’s Current SAR Rules to WPT Devices Will Ensure Their Safety and Prevent Harmful Interference

By utilizing well-established SAR and emission standards, test procedures, and limits for WPT devices, the Commission can ensure safe operation and mitigate harmful interference to other authorized devices. New and additional WPT-specific SAR rules are not required. As an initial matter, Energous commends the staff and leadership of the Commission’s Office of Engineering and Technology (“OET”) for the thoughtful guidance that it has provided regarding

application of the Commission's SAR requirements to WPT devices. Energous believes that its extensive interaction with OET staff on these issues has demonstrated that WPT proponents can successfully utilize the KDB process to work with OET to develop appropriate SAR measurement methodologies under the existing SAR rules. As a result, new WPT-specific SAR requirements are unwarranted.²⁷ If a particular WPT system or use case raises concerns regarding harmful RF exposure to humans or harmful RF interference to other devices, OET, on a case-by-case basis as part of the certification process, can address such concerns and, if warranted, impose conditions specific to those WPT devices as part of their equipment authorization.

E. The Commission Should Reduce its Reliance on Pre-Approval Guidance Procedures for Most WPT Devices and Should Permit Modular Authorization of WPT Devices

The Commission should treat WPT devices as mobile devices for equipment authorization purposes.²⁸ As with other mobile devices, if a WPT device satisfies the applicable RF exposure limits, the Commission should not require the device to be equipment authorized pursuant to its PAG procedures.²⁹ Similarly, PAG procedures also should not apply to any WPT devices that (i) are intended to operate with the receivers within 50 centimeters of the transmitter; (ii) do not require safety sensors to comply with applicable SAR requirements; or (iii) are non-beamforming. Energous proposes, however, that the Commission maintain PAG

²⁷ Energous recommends, however, that the Commission include an explicit acknowledgement in the WPT rules that sensors may be used for SAR compliance purposes. Specifically, the rules should expressly permit SAR compliance by WPT devices through the use of sensors that cause transmitters to cease transmissions when humans enter a restricted area.

²⁸ See generally 47 C.F.R. Part 2, Subpart J.

²⁹ See generally 47 C.F.R. § 2.964; Office of Engineering and Technology, Laboratory Division, Pre-Approval Guidance Procedure, KDB Publication 388624 D01.

equipment authorization procedures for all beamforming WPT devices and systems that require sensors to meet RF exposure requirements due to the complexities of their operations.

In addition, the Commission should expressly state in the new WPT rule part that WPT devices may be authorized on a modular basis.³⁰ WPT systems such as those designed by Energous are intended to be incorporated in many cases into consumer and industrial devices that will require equipment authorizations separate and apart from the authorization of the WPT systems that they utilize. To avoid the need for the WPT capabilities of the consumer and industrial devices to be newly authorized for each such device, the Commission should permit WPT transmitters to be authorized on a modular basis.

V. CONCLUSION

For the reasons set forth herein, the Commission should adopt a new WPT rule part, rather than continuing to apply ISM and Part 15 rules to WPT devices. Promulgation of a new rule part will enable the WPT industry to realize the full potential of WPT technology by freeing WPT devices from the ISM “local” use requirement and allowing WPT transmitters to embed communication to receivers in power transmissions for system control purposes. In addition, the Commission should identify specific frequency bands and maximum bandwidth requirements to be applicable to WPT devices, and it should rely on existing SAR requirements and emissions limits, rather than limiting the distance between a WPT transmitter and its receivers. The Commission also should limit the application of PAG procedures to WPT devices and should permit WPT devices to be authorized on a modular basis.

³⁰ See generally 47 C.F.R. § 15.212.

By increasing regulatory certainty and reducing regulatory delay, the new WPT rule part proposed herein will further unleash innovation in the WPT sector and promote expedited commercial adoption and employment of WPT technologies. This, in turn, will enable American WPT companies to maintain their global leadership role. Energous looks forward to continuing to work with OET to accomplish these important goals.